

ANNUAL REPORT FOR 2006



Roanoke Island Mitigation Site
Dare County
Project No. 8.1052501
TIP No. K-4003



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February 2007

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SUMMARY

The following report summarizes the monitoring activities that have occurred in the past year at the Roanoke Island Mitigation Site. The site was constructed to serve as mitigation for the Roanoke Island Visitor Center/ Rest Area; approximately 1.77 acres of impacts are mitigated for onsite and the remaining 1.36 acres of preservation were debited from the Mashoes Road Mitigation Site. The Roanoke Island Site was constructed in 2002 and this report details the fifth year of hydrology monitoring and first year of vegetation monitoring following construction.

There are three gauges located in the north tract with two gauges in the constructed area and one gauge in the reference area. There are eight gauges located in the south tract with four gauges in the constructed area and four corresponding gauges in the reference area. For the three north tract gauges, only one of the gauges met the 20% saturation period for its respective reference gauge. For the eight south tract gauges, two of the gauges met the 20% saturation period for their respective reference gauges. The two gauges that failed, would have met the 20% saturation period for its corresponding reference gauge had it not been for gauge malfunctions.

Data from the fifth year of hydrologic monitoring indicates that all eleven monitoring gauges demonstrated saturation within 12 inches of the surface for at least 12.5% of the growing season. Gauge RIST-7 (ref) was moved to a more suitable location based on similar elevation in August 2005, and met saturation within 12 inches of the surface for 57.4% of the growing season.

This site was replanted with bareroot seedlings in March 2006. Due to high soluble salt levels at the site, the hardwood vegetation is surviving in very low numbers. The preservation areas that were inadvertently cleared during construction of the site in 2002 were replanted. Photo documentation of the mechanized clearing areas will continue to be provided to show the progression of the area returning to its original state.

NCDOT will continue to monitor vegetation and hydrology at the Roanoke Island Mitigation Site.

1.0 INTRODUCTION

1.1 Project Description

The Roanoke Island Site serves as onsite mitigation for the Roanoke Island Visitor Center/Rest Area, located adjacent to the new US 64-264 Manteo Bypass. The site is divided into two tracts; the “south” tract is on the same property as the Visitor Center and the “north” tract is located approximately 600 feet north of the Visitor Center (Figure 1). The mitigation is associated with Project 8.1052501, TIP Numbers K-4003 and R-2551.

The site is designed to provide 0.11 acres of restoration (1:1) and 1.66 acres of creation (1:1) of Estuarine Fringe wetlands. The site also includes 1.29 acres (5:1) of estuarine preservation. In addition, approximately 1,004 feet of riparian buffer was planted with the same vegetation mix as that used in the wetland zones. The width of the buffer zone varies between 9 and 65 feet based on NCDOT property limits. The construction plan for the wetland sites involved grading the former borrow pit areas to meet the elevations of adjacent jurisdictional wetlands.

1.2 Purpose

In order to demonstrate successful mitigation, hydrologic and vegetative monitoring must be conducted for a minimum of five years or until success criteria are fulfilled. Success criteria are based on federal guidelines for wetland mitigation and are stipulated in the “Roanoke Island Visitor Center/ Rest Area Mitigation Plan” dated May 2001 (revised July 2001). These guidelines stipulate criteria for both hydrologic conditions and vegetation survival. The following report details the results of hydrologic and vegetative monitoring during 2006 at the Roanoke Island Mitigation Site.

Activities in 2006 reflect the fifth year of hydrology monitoring and the first year of vegetation monitoring at the mitigation site. Included in this report are analyses of both hydrologic and vegetative monitoring results, as well as local climate conditions throughout the growing season.



Figure 1. Site Location Map

1.3 Project History

March 2002	Construction Completed
March 2002	Monitoring Gauges Installed
March 2002	Site Planted
March- November 2002	Hydrologic Monitoring (Year 1)
June 2002	Vegetation Monitoring (Year 1)
March- November 2003	Hydrologic Monitoring (Year 2)
September 2003	Vegetation Monitoring (Year 2)
February 2004	Site Replanted
March- November 2004	Hydrologic Monitoring (Year 3)
July 2004	Vegetation Monitoring (Year 1 Restart)
March 2005	Site Replanted
March- November 2005	Hydrologic Monitoring (Year 4)
August 2005	Vegetation Monitoring (Year 1 Restart)
March 2006	Applied Soil Amendments and Tilled Site
March 2006	Site Replanted
March- November 2006	Hydrologic Monitoring (Year 5)
August 2006	Vegetation Monitoring (Year 1 Restart)

2.0 HYDROLOGY

2.1 Success Criteria

While a constructed site must typically meet jurisdictional criteria of inundation or saturation within 12 inches of the surface for at least 12.5% of the growing season, NCDOT and consulting agencies agreed that other criteria might be the best indicator of hydrologic success on this particular site. In accordance with the guidelines set forth by the approved mitigation plans, hydrologic success is dictated by the hydrologic condition of the reference wetlands adjacent to the sites. Monitoring gauges are located in both the constructed and reference areas. The site is considered a hydrologic success if the hydrologic frequency, duration and depth are within 20% of its respective reference wetland.

The growing season in Dare County begins March 13 and ends November 25. The dates correspond to a 50% probability that temperatures will drop to 28° F or lower after

March 13 and before November 25.¹ The growing season is 258 days; therefore the optimum duration for wetland hydrology is 32 days. While the monitoring gauges record ground/surface water levels throughout the year, special attention is placed on water levels during the 258-day growing season. In addition, local rainfall totals are monitored to ensure that the site is functioning in normal climatic conditions.

2.2 Hydrologic Description

The site was constructed by grading the existing fill material down to meet the elevations of existing reference wetlands. The removed fill material is associated with borrow pit/ spoil basins that were previously onsite. Eleven monitoring gauges were installed on the site in order to monitor the new hydrologic conditions. Three gauges were located on the north tract and eight gauges were located on the south tract. Of these, one gauge is located within the north tract reference wetland, while four gauges are located within reference areas in the south tract. The success of the site is determined by comparing the groundwater levels in the reference areas with those in the constructed zones.

Site rainfall is monitored with a rainfall gauge located onsite. In addition, the recorded data is compared to rainfall data at the Manteo Airport gauge in order to check the accuracy of the measured data. The NC State Climate Office provided the Manteo data. Figures 2 and 3 are monitoring gauge maps of the north and south tracts, respectively.

2.3 Results of Hydrologic Monitoring

2.3.1 Site Data

Table 1 is a summary of the hydrologic monitoring results for both the north and south tracts. The mitigation plan states that the hydrologic conditions of the constructed areas must be within 20% of those in the reference areas. Figures 4 and 5 are representations of the hydrologic monitoring results.

Appendix A contains a plot of the groundwater depth for each monitoring gauge. While success of the site is based on reference wetlands and not the percentage of the growing season that the groundwater is within 12 inches of the surface, the 12-inch line is provided for reference. The number of days the water level was above this line is also provided on each graph. Precipitation events, as recorded by the onsite rain gauge, are included on each graph as bars.

¹ Natural Resources Conservation Service, Soil Survey of Dare County, North Carolina, p.69.

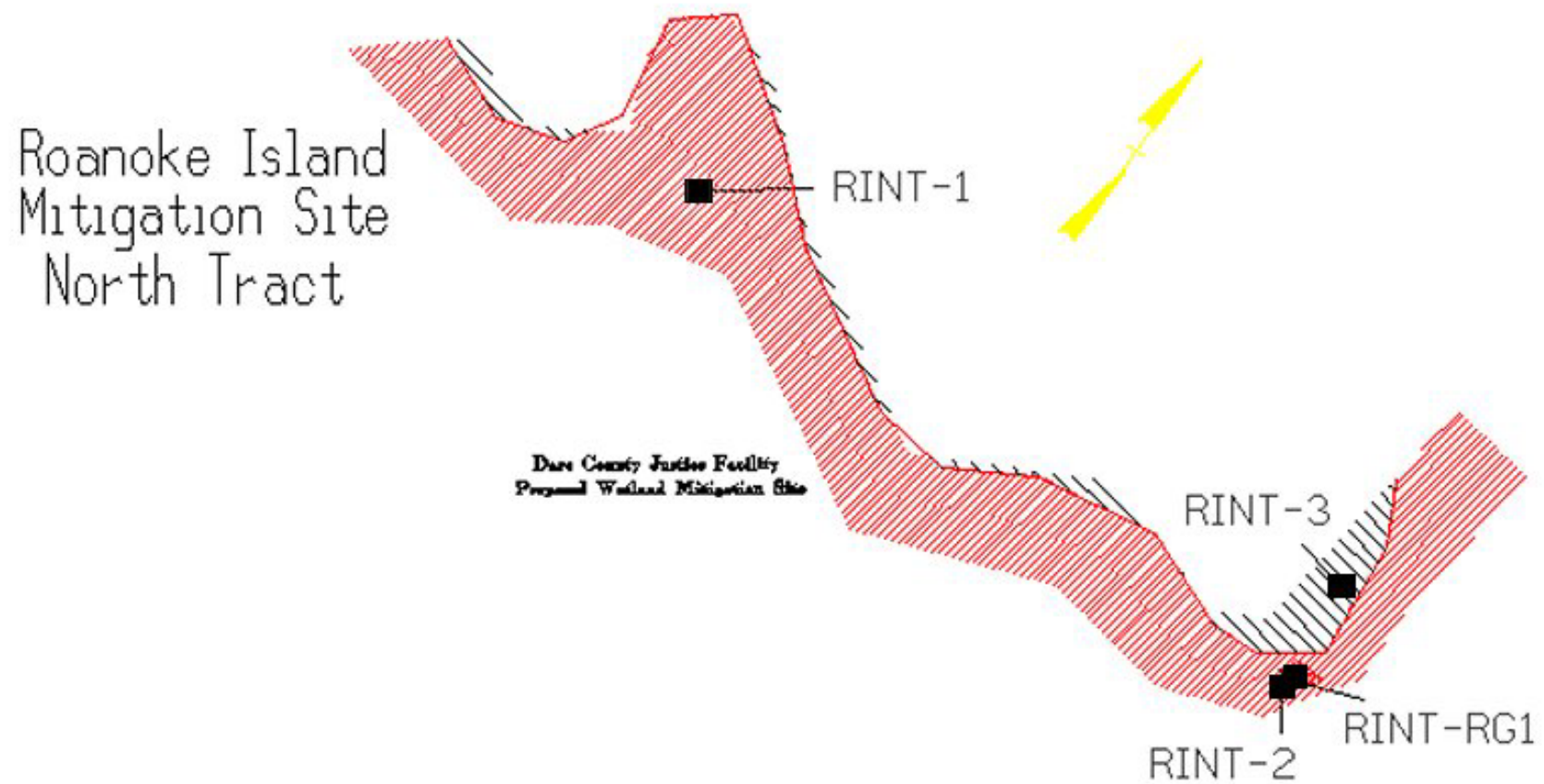


Figure 2. Gauge Location Map - North Tract

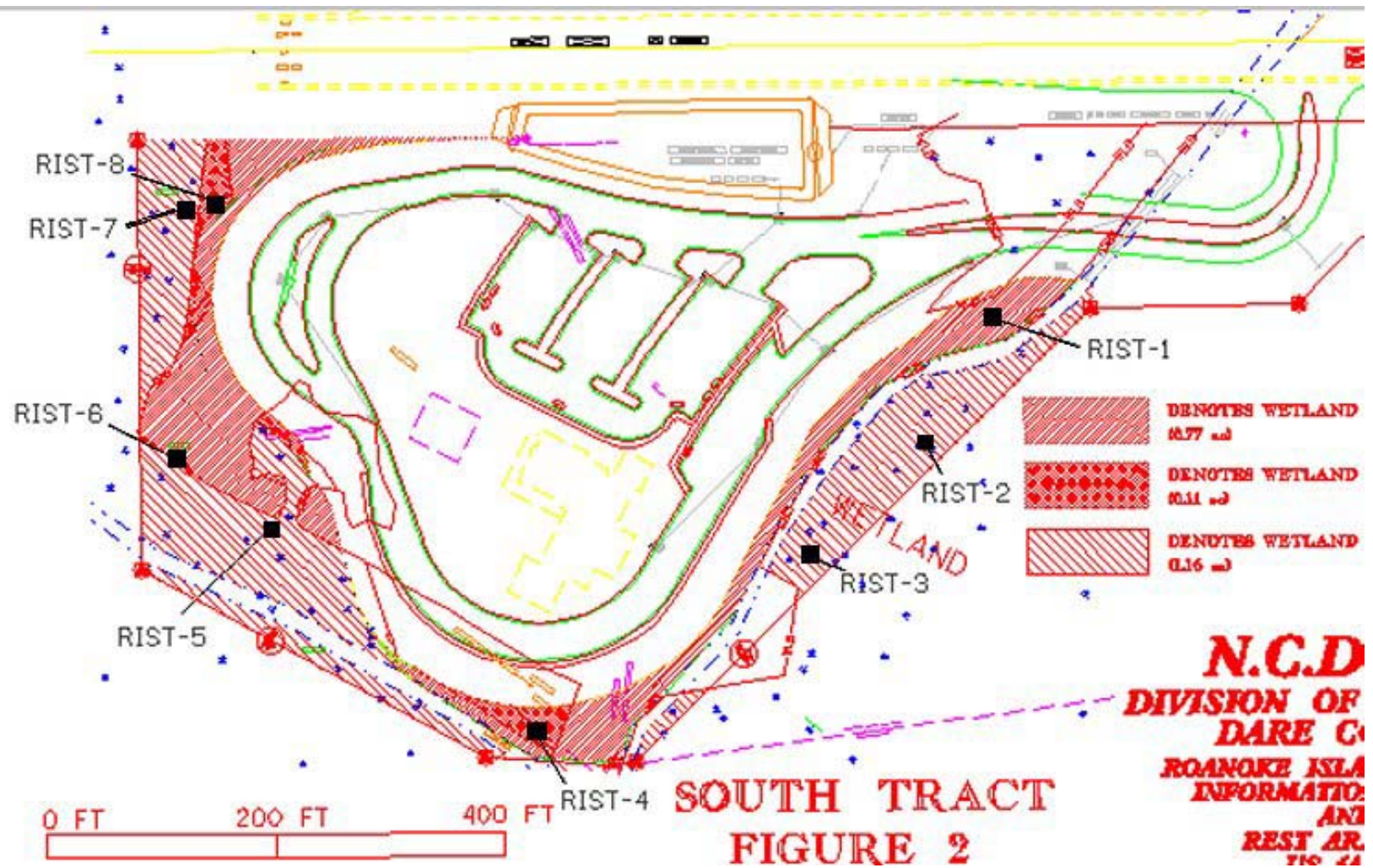


Figure 3. Gauge Location Map - South Tract

Table 1. Hydrologic Monitoring Results

Monitoring Gauge	< 5%	5 - 12%	> 12.5%	20% Saturation Criteria to Reference	Actual Consecutive %	Dates of Success
North Tract						
RINT-1			×	×	96.9	March 21-Nov 25
RINT-2			×		53.9	March 21-August 6 August 22-Nov 25
RINT-3 (ref)			×		100	March 13-Nov 25
South Tract						
RIST-1			×		63.2	March 13-Aug 22
RIST-2 (ref)			×		100	March 13-Nov 25
RIST-3 (ref)			×		100	March 13-Nov 25
RIST-4			×		67.4	March 13- Sept 2 Sept 30-Nov 25
RIST-5 (ref)			×		77.9	March 13-Sept 29
RIST-6			×	×	100	March 13-Nov 25
RIST-7 (ref)			×		57.4	March 13-Aug 7 Aug 18-Nov 25
RIST-8			×	×	100	March 13-Nov 25

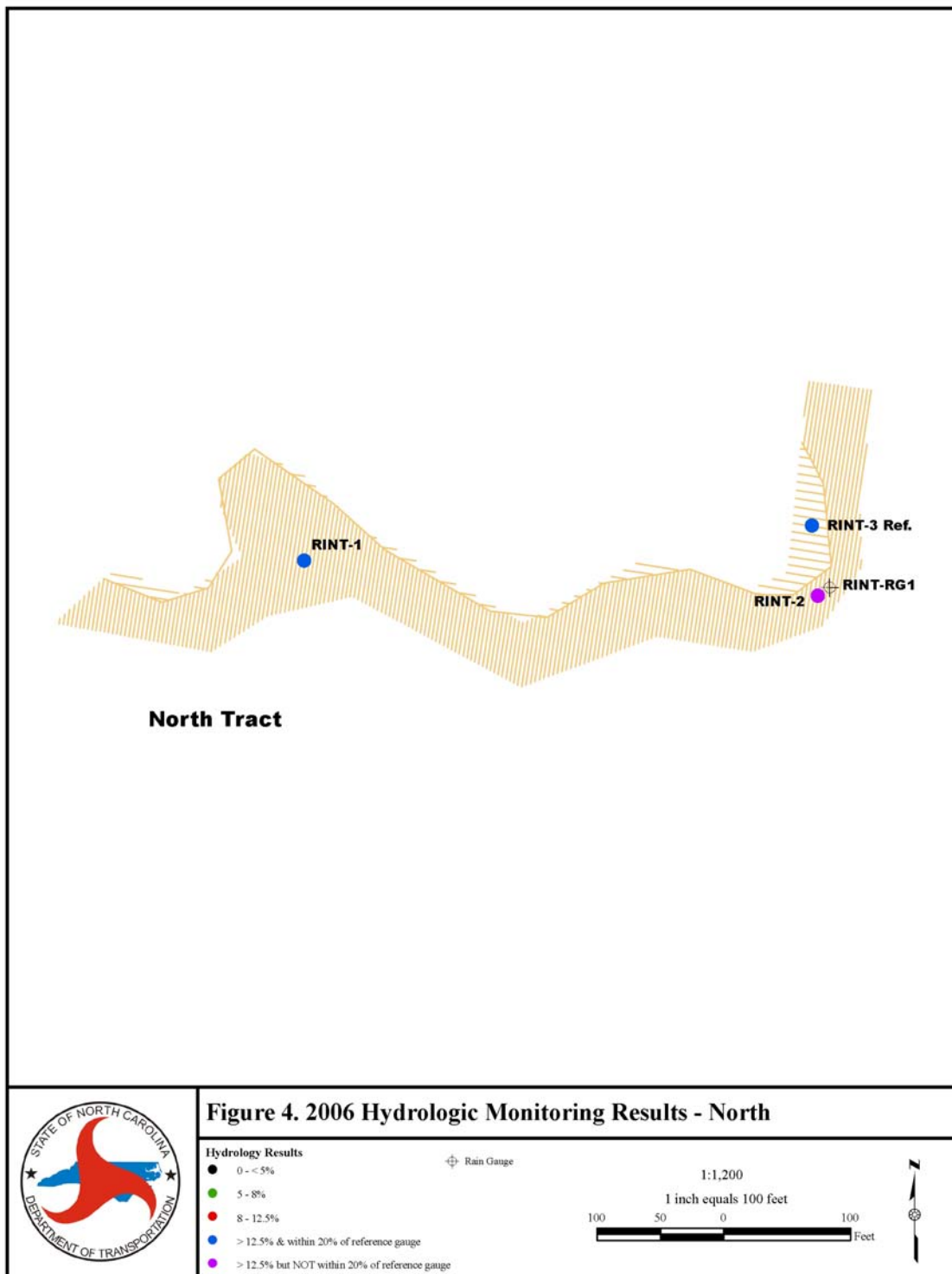
Notes: "RINT" denotes gauges on the northern tract.

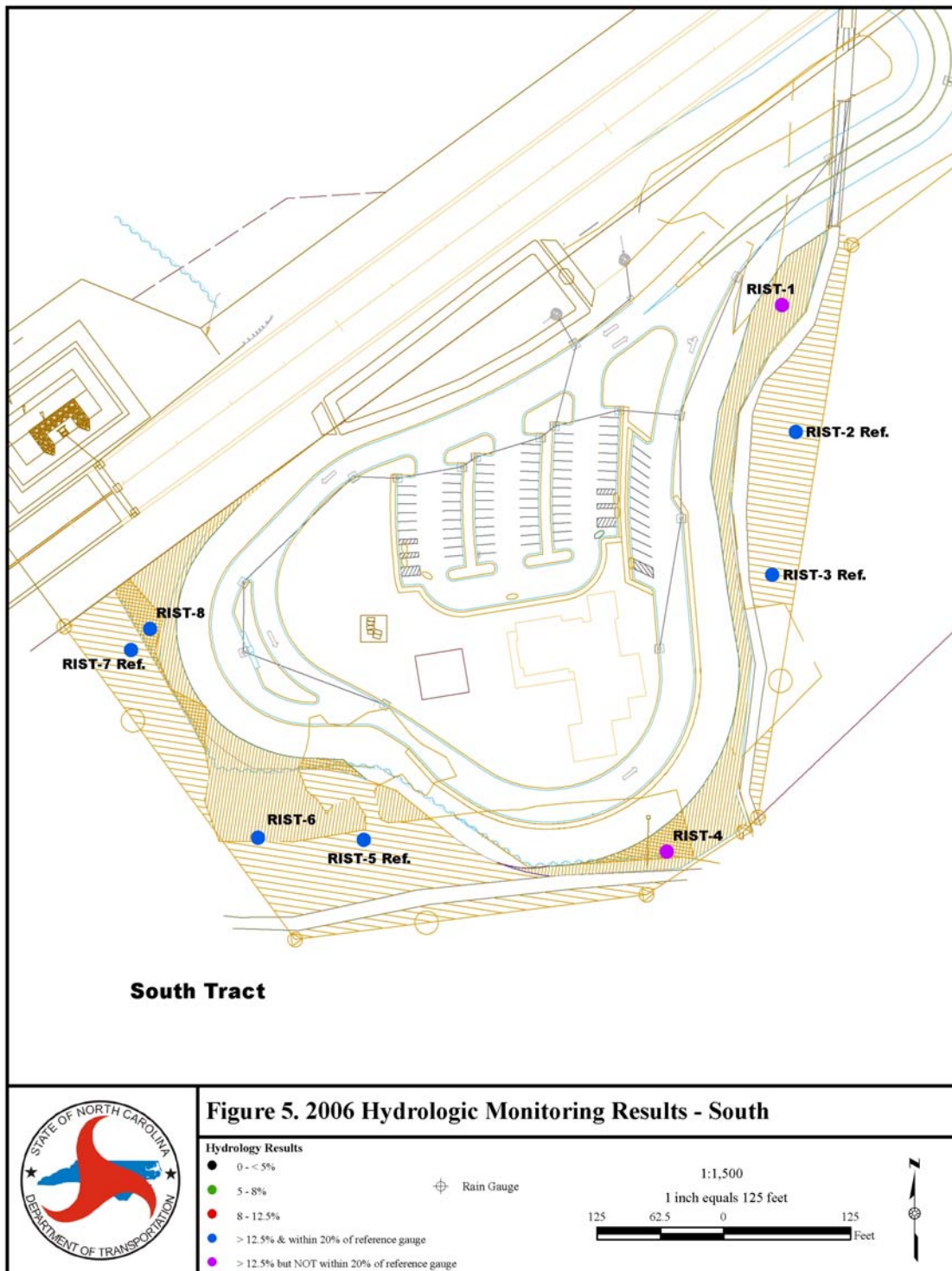
"RIST" denotes gauges on the southern tract.

"ref" denotes gauges in preservation areas of the site, used as reference wetlands.

Specific Gauge Problems:

- RIST-1 experienced gauge and battery malfunctions during (August 23-September 29) and (October 6-October 26).
- RIST-4 experienced a gauge malfunction during (September 3-September 29).
- RIST-5 experienced a gauge malfunction during (September 30-October 26).





2.3.2 Climatic Data

Figure 6 provides an evaluation of the local climate in comparison with historical data in order to determine whether 2006 was “normal” in terms of climate conditions. The two lines represent the 30th and 70th percentiles of monthly precipitation for Manteo, NC. The bars are monthly rainfall totals for 2006. The historical data was collected from the State Climate Office of North Carolina.

For the 2006 year the below average rainfall includes; February, March, August, and October. January, April, May, June, and July experienced average rainfall. The months of September and November experienced above average rainfall for the year. Overall the site experienced average rainfall in 2006.

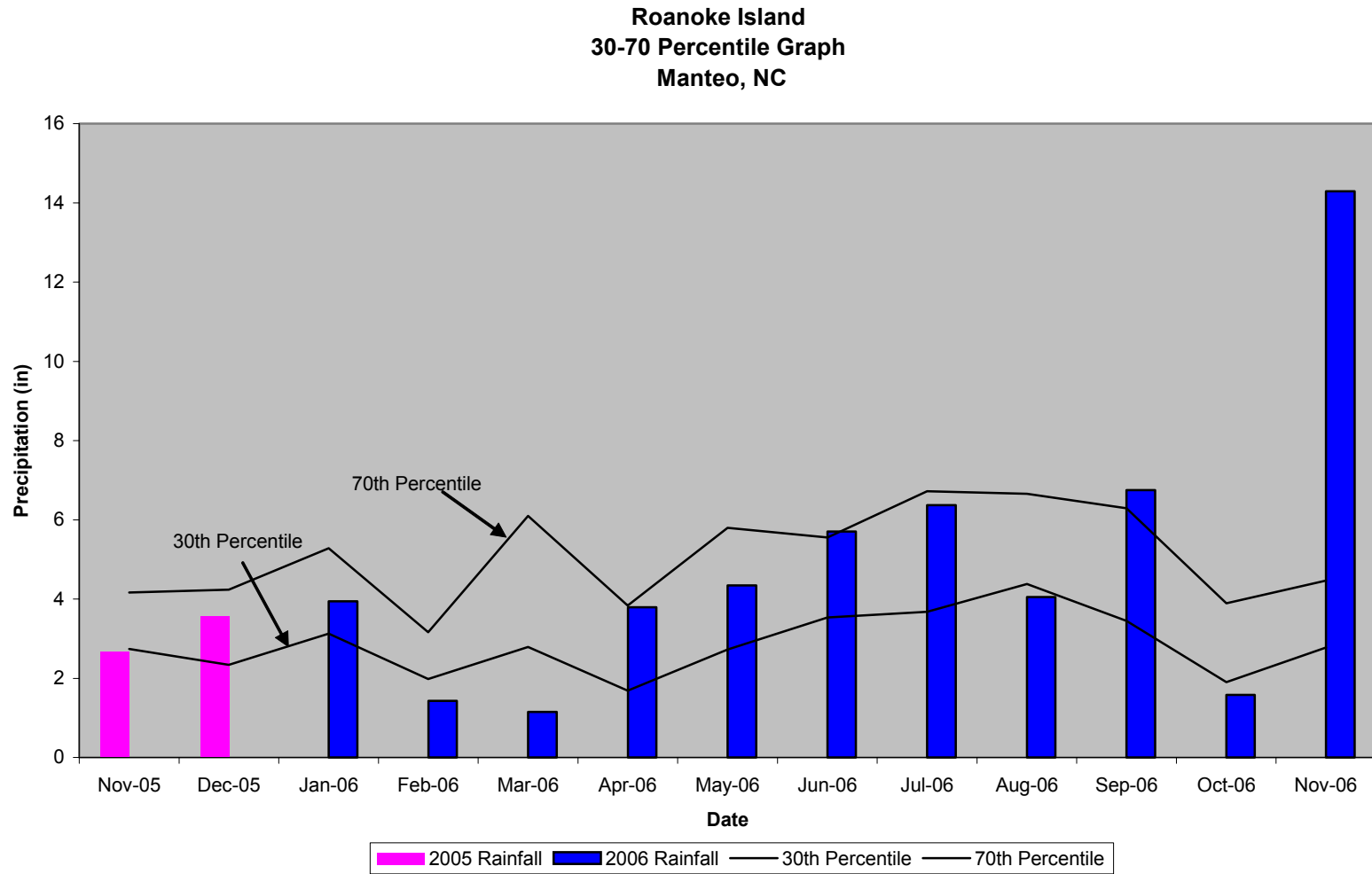
2.4 Conclusions

Data from the fifth year of hydrologic monitoring indicates that all eleven monitoring gauges demonstrated saturation within 12 inches of the surface for at least 12.5% of the growing season. Gauge RIST-7 (ref) was moved to a more suitable location based on similar elevation in August 2005, and met saturation within 12 inches of the surface for 57.4% of the growing season.

RINT-1 met within the 20% saturation period, while RINT-2 did not meet the saturation period for the corresponding reference gauge RINT-3. RIST-1 and RIST-4 did not meet the 20% saturation period for their corresponding reference gauges. RIST-5 met the 20% saturation period, meeting approximately 80% of the growing season with it's corresponding reference gauge RIST-6. RINT-8 met the 20% saturation period by exceeding the corresponding reference gauge. RIST-1 and RIST-4 experienced gauge malfunctions during the growing season, however these gauges would have met the 20% saturation period for it's corresponding reference gauge had it not been for gauge malfunctions.

NCDOT recommends that hydrologic monitoring continue on the Roanoke Island Mitigation Site.

Figure 6. 30-70 Percentile Graph



3.0 VEGETATION: ROANOKE ISLAND VISITOR CENTER (YEAR 1 MONITORING)

3.1 Success Criteria

The success criteria state that there must be a minimum of 320 trees per acre living for at least three consecutive years. A minimum of 290 trees per acre living at year 4 and a minimum of 260 trees per acre living at year 5.

3.2 Description of Species

The following tree species were planted in the Wetland Enhancement Area:

Taxodium distichum, Baldcypress

Myrica cerifera, Wax Myrtle

Persea palustris, Swamp Redbay

Nyssa sylvatica var. *biflora*, Swamp Blackgum

Gordonia lasianthus, Loblolly Bay

Chamaecyparis thyoides, Atlantic White Cedar

3.3 Results of Vegetation Monitoring

The 2006 vegetation monitoring revealed that very few hardwood species were surviving. Baldcypress, swamp blackgum, and wax myrtles were noted surviving in vegetation plots 1, 2, and 3. There were no trees surviving in vegetation plot 4.

Site Notes: Other species noted: *Juncus* sp., cattail, woolgrass, pine, golden rod, water grass, *Scripus americanus*, *Pluchea* sp., sawgrass, phragmites, marsh-elder, and *Baccharis halimifolia*.

3.4 Conclusions

Approximately 1.8 acres of the site were planted in the wetland restoration and creation areas in March 2002. The site was replanted in February 2004 and March 2005. In an attempt to achieve greater survival rate of planted hardwood vegetation on the site, the following steps were conducted in March 2006. NCDOT applied treatment of 1 ton of gypsum and 1 ton of hydrated lime. The site was tilled and planted with bareroot seedlings on four-foot centers. The 2006 vegetation monitoring revealed that these steps failed on the site. The planted hardwood vegetation were surviving in very low numbers due to the high soluble salt levels on the site, however the baldcypress, swamp blackgum, and wax myrtle were noted as surviving in small numbers.

During construction of the mitigation site in 2002, approximately 0.29 acres of wetland preservation area was inadvertently cleared. These mechanized clearing areas are adjacent to the creation areas on the North and South Tracts. This activity was referenced in a letter to the Corps dated March 6, 2002. Per the letter to the Corps, the preservation areas have been replanted. NCDOT will continue to provide photo documentation of the mechanized clearing areas to show the progression of the area returning to its original state.

NCDOT will coordinate with the resource agencies in 2007 to determine the appropriate action that needs to be taken to provide the required mitigation at the Roanoke Island Visitors Center.

4.0 OVERALL CONCLUSIONS/ RECOMMENDATIONS

There are three gauges located in the north tract with two gauges in the constructed area and one gauge in the reference area. There are eight gauges located in the south tract with four gauges in the constructed area and four corresponding gauges in the reference area. For the three north tract gauges, only one of the gauges met the 20% saturation period for its respective reference gauge. For the eight south tract gauges, two of the gauges met the 20% saturation period for their respective reference gauges. The two gauges that failed, would have met the 20% saturation period for its corresponding reference gauge had it not been for gauge malfunctions.

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NCDOT will continue to monitor the Roanoke Island Mitigation Site for hydrology and vegetation. NCDOT will coordinate with the resource agencies in 2007 to determine the appropriate action that needs to be taken to provide the required mitigation at the Roanoke Island Visitors Center.

APPENDIX A

GAUGE DATA GRAPHS

APPENDIX B

SITE PHOTOGRAPHS

PHOTO AND VEGETATION PLOT LOCATIONS

MECHANIZED CLEARING PHOTOGRAPHS

MECHANIZED CLEARING IMPACT AREAS

ROANOKE ISLAND VISITOR CENTER



Photo 1



Photo 2



Photo 3



Photo 4



Photo 5



Photo 6

August 2006

ROANOKE ISLAND VISITOR CENTER

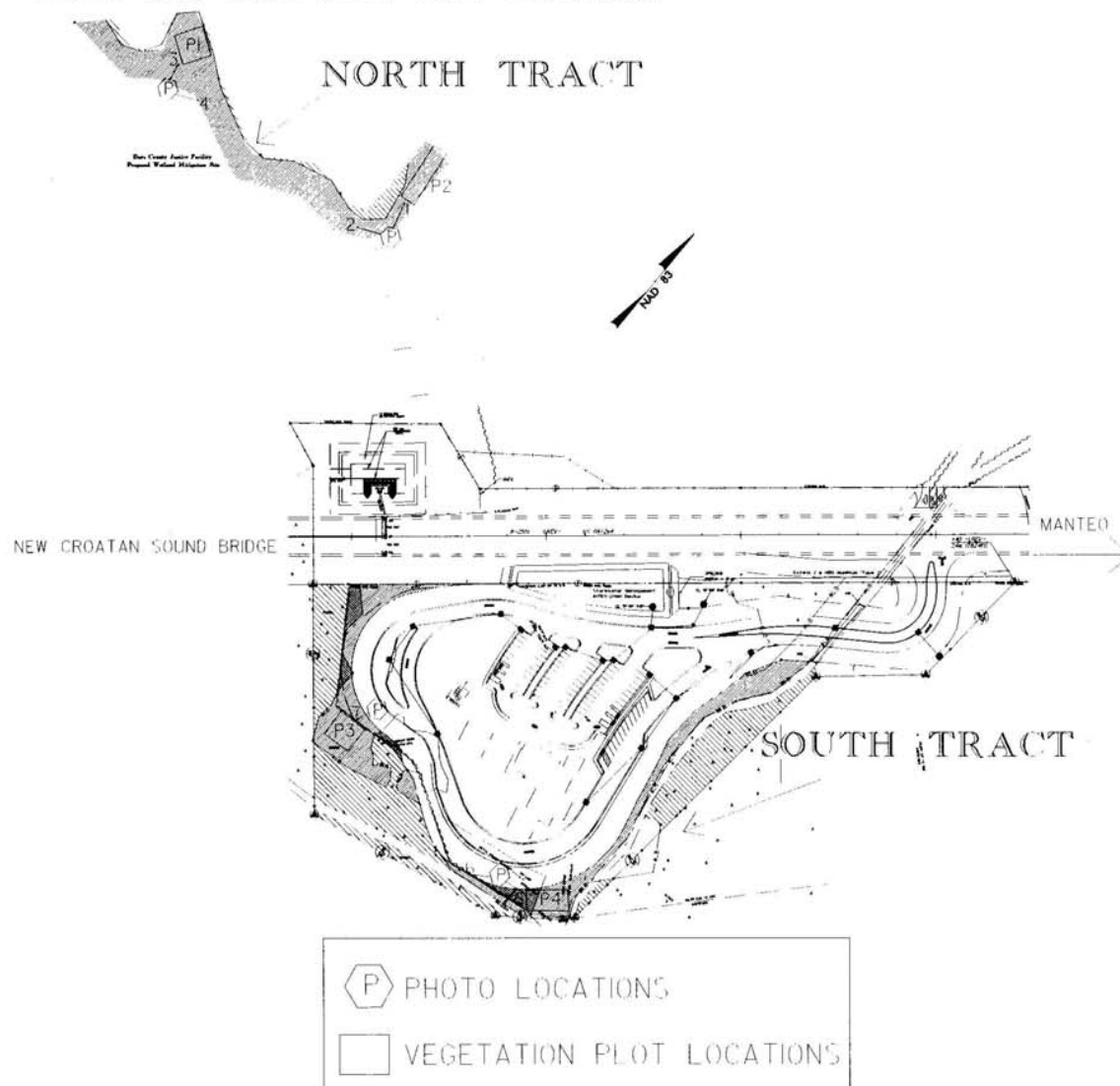


Photo 7

August 2006

ROANOKE ISLAND VISITOR CENTER

PHOTO AND VEGETATION PLOT LOCATIONS



ROANOKE ISLAND VISITOR CENTER

Mechanized Clearing Photographs



Photo 1



Photo 2



Photo 3



Photo 4



Photo 5



Photo 6

January 2007

ROANOKE ISLAND VISITOR CENTER

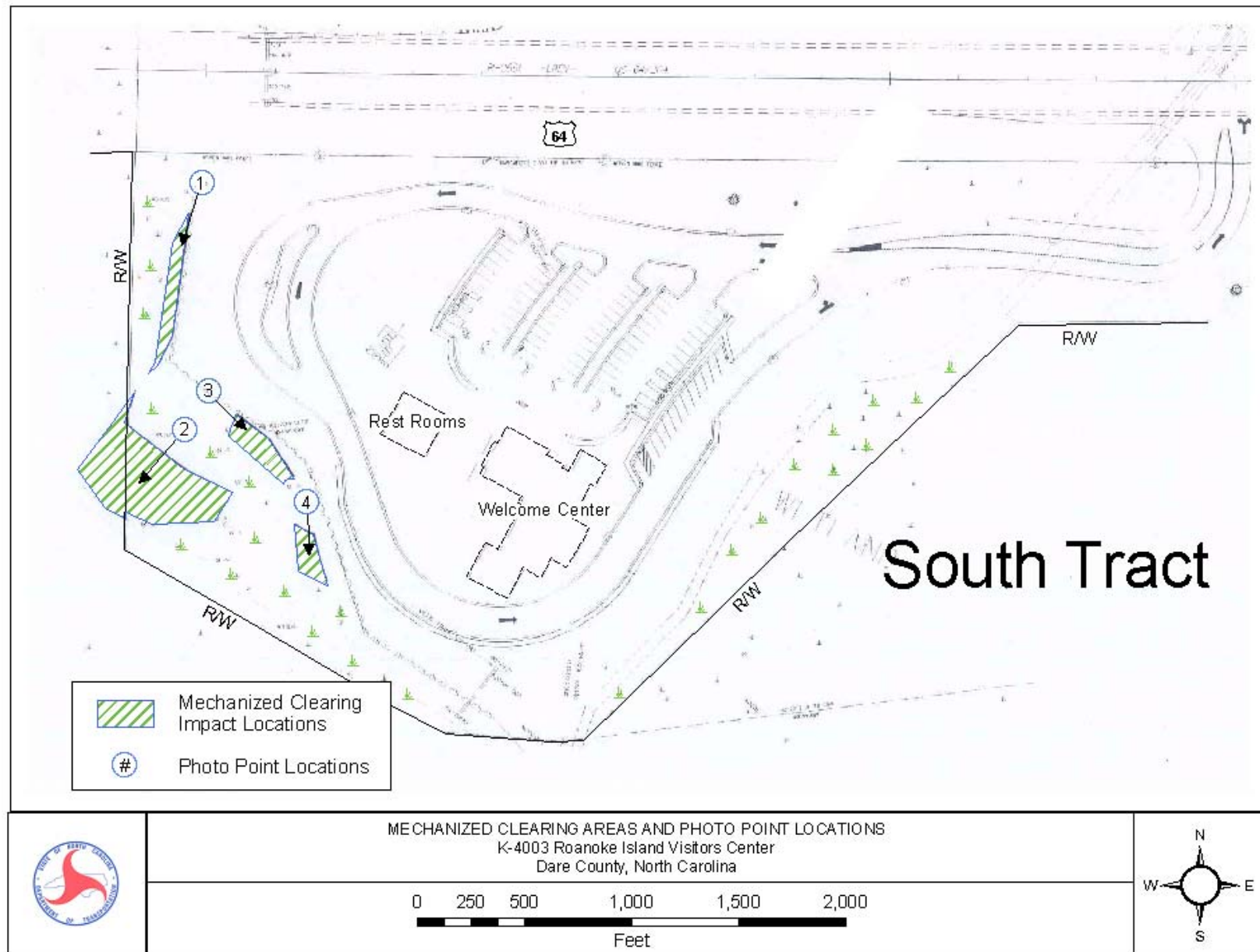
Mechanized Clearing Photographs



Photo 7

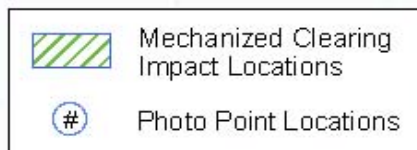


Photo 8

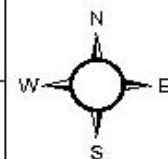
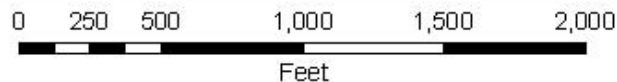


Mechanized Clearing Impact Areas – South Tract

North Tract



MECHANIZED CLEARING AREAS AND PHOTO POINT LOCATIONS
 K-4003 Roanoke Island Visitors Center
 Dare County, North Carolina



Mechanized Clearing Impact Areas – North Tract